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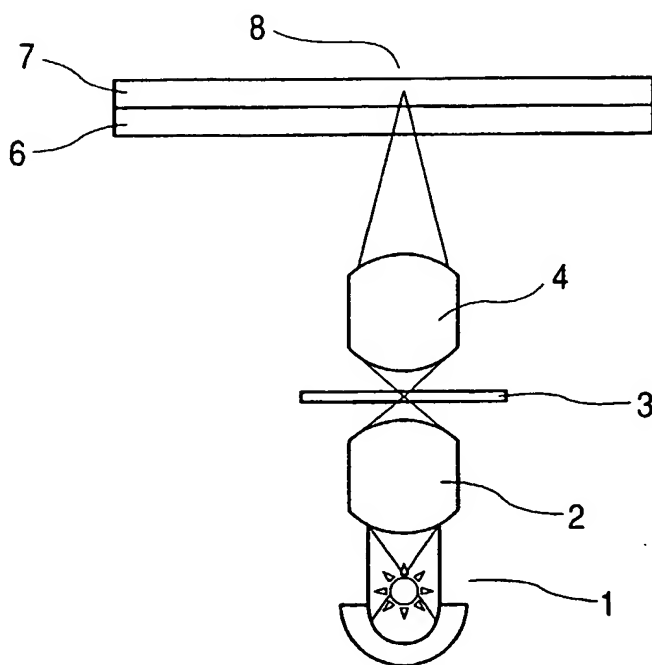
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24 February 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: APPARATUS FOR HANDLING MINUTE OBJECT



(57) Abstract: An apparatus for handling a minute object such as a cell by using a holographic optical tweezers that comprises a laser light source 1, holographic plate 3 having a specified pattern to form a hologram with light emitted from the light source, and a transparent plate that holds a liquid including a minute object, wherein the holographic plate 3 is irradiated with laser light emitted from the laser light source 1, and the laser light passed through the holographic plate 3 is focused in a sample solution 7 held on the transparent plate 6 to form a hologram having a pattern according to the pattern of the holographic plate 3 in the sample solution 7.

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>10001152WO01</b>	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <b>PCT/JP2004/005550</b>	International filing date (day/month/year) <b>19/04/2004</b>	(Earliest) Priority Date (day/month/year) <b>25/04/2003</b>
Applicant  <b>CANON KABUSHIKI KAISHA</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box II).

3. ☐ **Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regards to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☐ none of the figures is to be published with the abstract.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/JP2004/005550

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G21K1/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G21K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LIESENER J ET AL: "Multi-functional optical tweezers using computer-generated holograms" OPTICS COMMUNICATIONS, NORTH-HOLLAND PUBLISHING CO. AMSTERDAM, NL, vol. 185, no. 1-3, 1 November 2000 (2000-11-01), pages 77-82, XP004219458 ISSN: 0030-4018 the whole document	1-5
X	US 6 416 190 B1 (CURTIS JENNIFER E ET AL) 9 July 2002 (2002-07-09) column 1, line 19 - column 1, line 38; figures 1-6,8,10 column 4, line 40 - column 8, line 12 column 10, line 40 - column 10, line 49 column 11, line 3 - column 13, line 9 ----- -/--	1-5

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

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05/11/2004

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP2004/005550

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KORDA PAMELA ET AL: "Nanofabrication with holographic optical tweezers" REVIEW OF SCIENTIFIC INSTRUMENTS, AMERICAN INSTITUTE OF PHYSICS, US, vol. 73, no. 4, April 2002 (2002-04), pages 1956-1957, XP012039995 ISSN: 0034-6748 the whole document -----	1-5
X	DUFRESNE ERIC R ET AL: "Computer-generated holographic optical tweezer arrays" REVIEW OF SCIENTIFIC INSTRUMENTS, AMERICAN INSTITUTE OF PHYSICS, US, vol. 72, no. 3, March 2001 (2001-03), pages 1810-1816, XP012039046 ISSN: 0034-6748 the whole document -----	1-5
X	CURTIS J E ET AL: "Dynamic holographic optical tweezers" OPTICS COMMUNICATIONS, NORTH-HOLLAND PUBLISHING CO. AMSTERDAM, NL, vol. 207, no. 1-6, 15 June 2002 (2002-06-15), pages 169-175, XP004362024 ISSN: 0030-4018 the whole document -----	1-5
X	US 2003/047676 A1 (GRIER DAVID G ET AL) 13 March 2003 (2003-03-13) paragraph '0021! - paragraph '0046! figures 1A,1B -----	1-5

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP2004/005550

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6416190	B1	09-07-2002	CA 2445336 A1	07-11-2002
			EP 1382231 A2	21-01-2004
			JP 2004527255 T	09-09-2004
			WO 02088704 A2	07-11-2002
			US 2002181113 A1	05-12-2002
			US 2004036976 A1	26-02-2004
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US 2003047676	A1	13-03-2003	EP 1425944 A1	09-06-2004
			WO 03024163 A1	20-03-2003
			US 2003206220 A1	06-11-2003
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